MCHE 201: Introduction to Engineering Design

Spring 2019

Dr. Joshua Vaughan

Rougeou 225

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@Doc_Vaughan

First, Some Info on Me

- Grew up in Southern Virginia
- Bachelor's from Hampden-Sydney College in May 2002
  - Double Major: Physics and Applied Math

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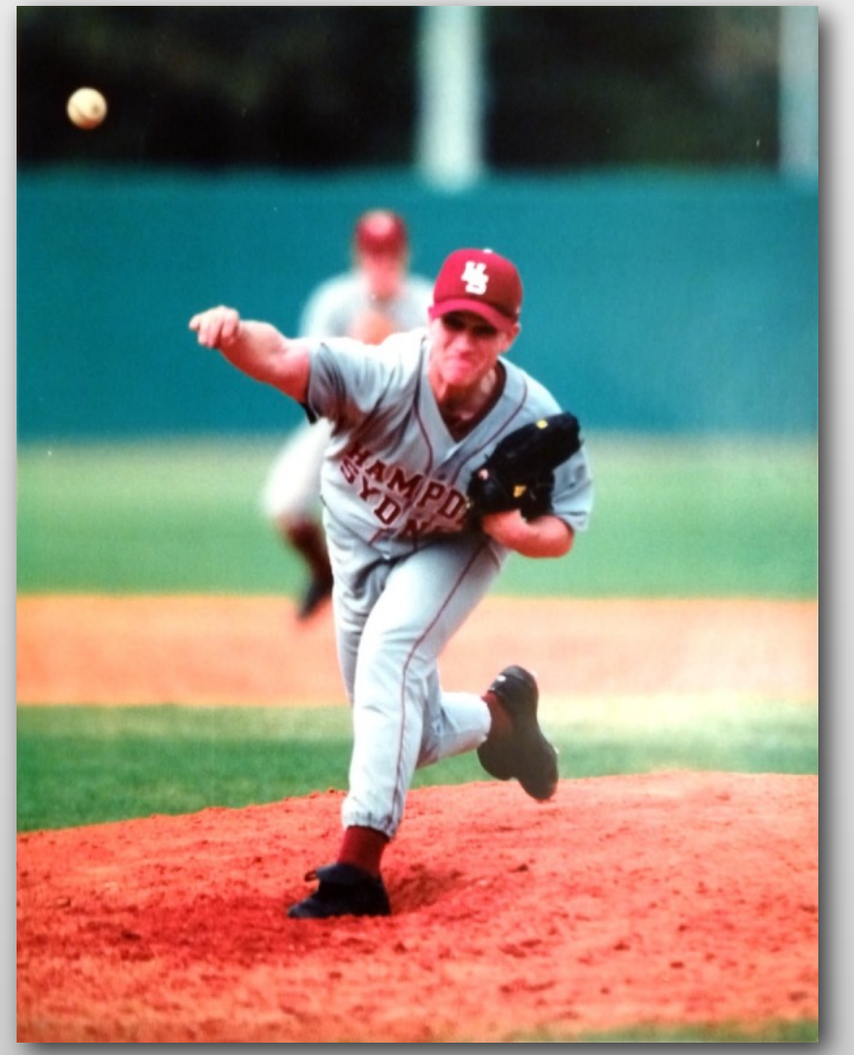
  - 4-year starting pitcher



Grad. School

- Graduate School at Georgia Tech
  - Advisor: Dr. William Singhose
  - M.S. in May 2004
    - ✦ Thesis: *Active and Semi-Active Control to Counter Vehicle Payload Variation*
  - Ph.D. in August 2008
    - ✦ Thesis: *Dynamics and Control of Mobile Cranes*

Postdoc

- Tokyo Institute of Technology with Dr. Shigeo Hirose

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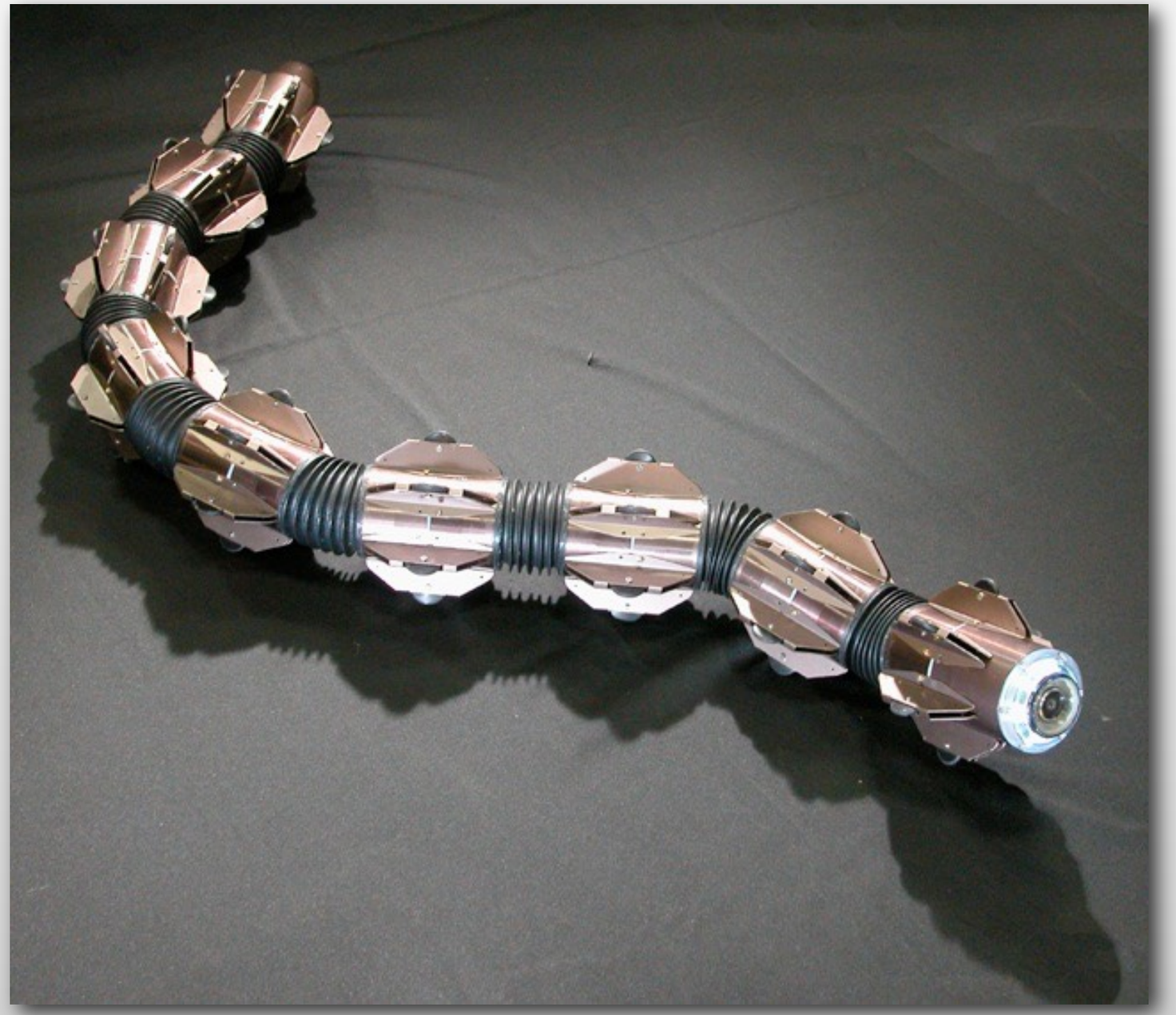
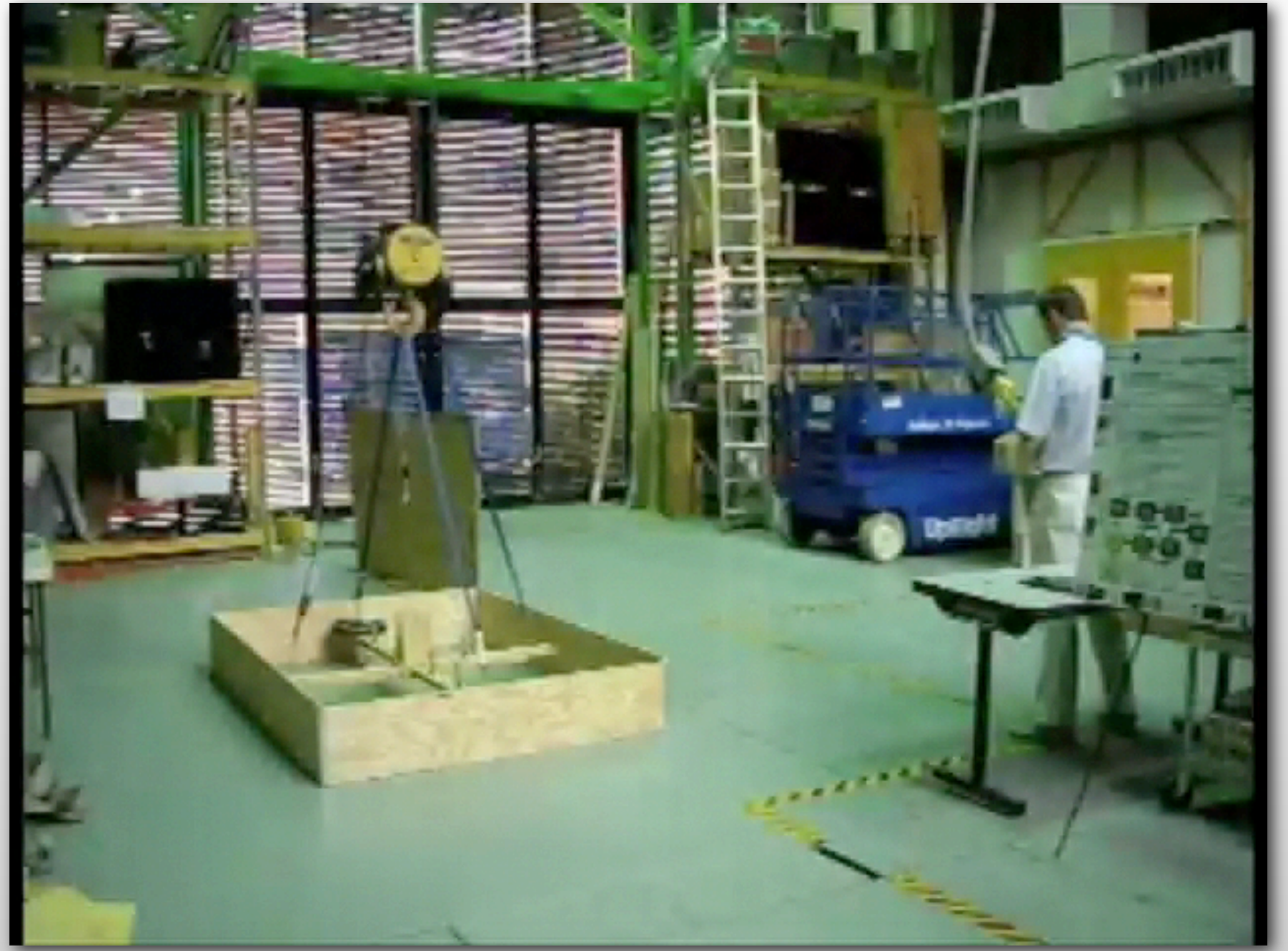
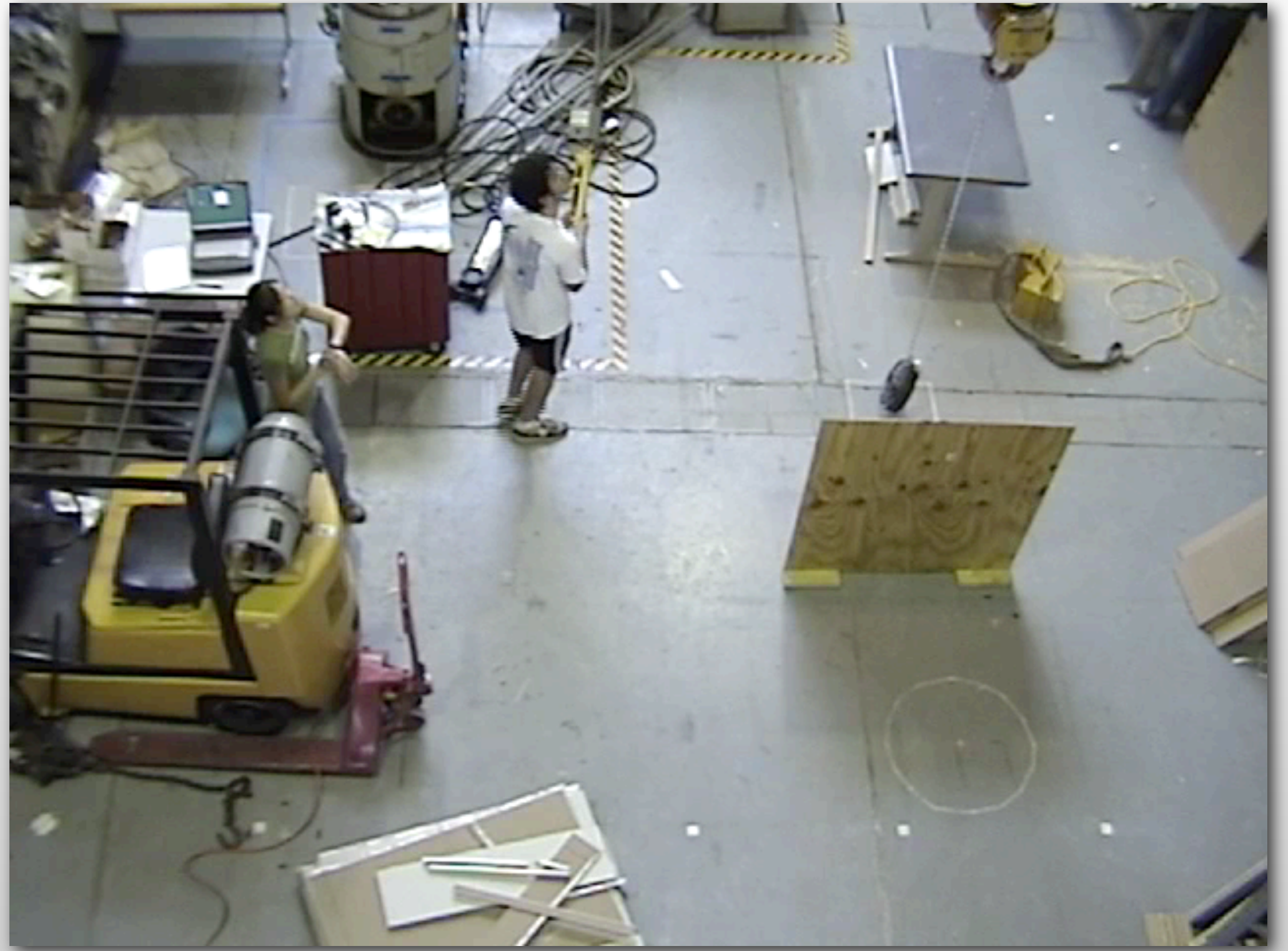


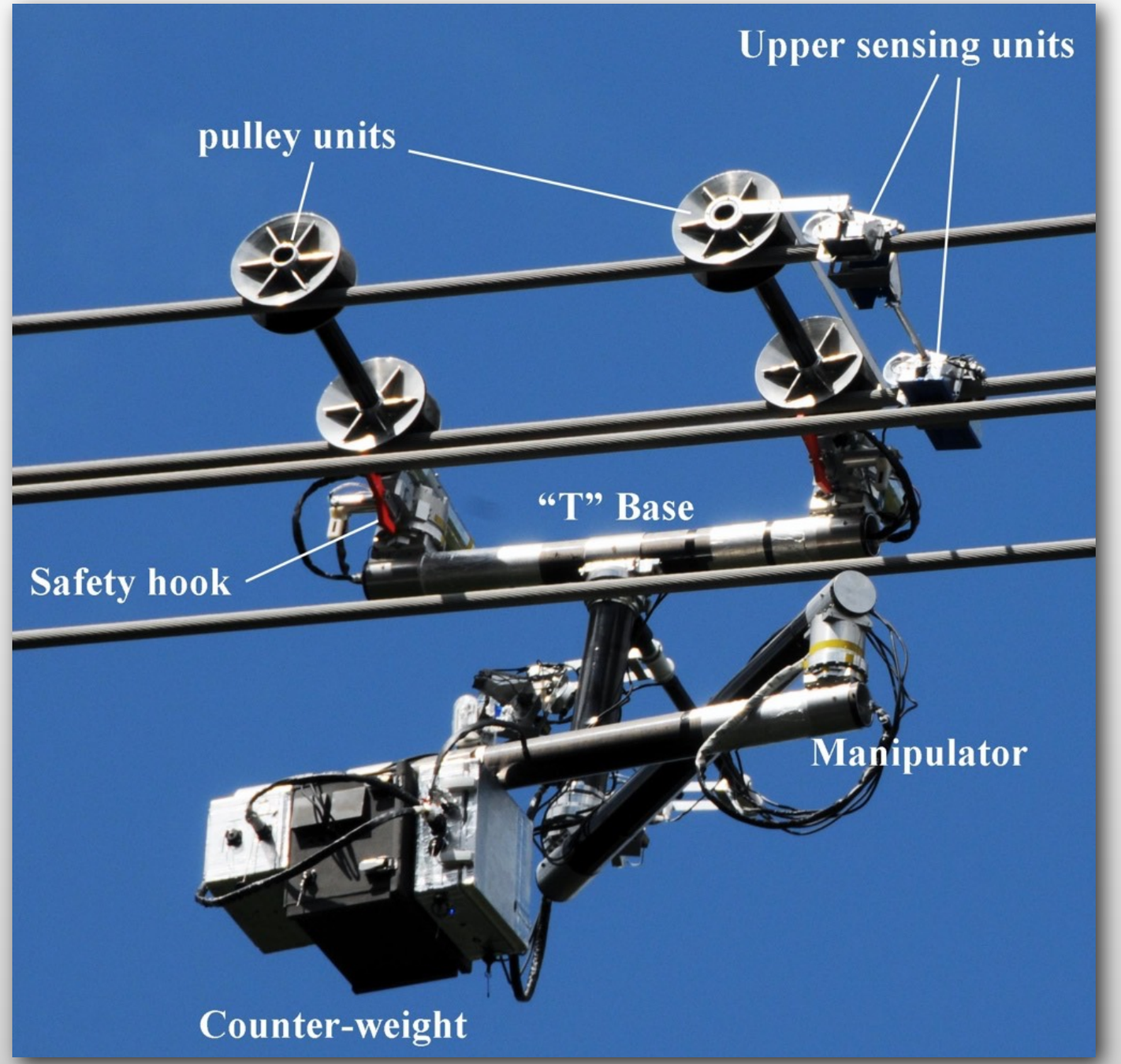
10-ton Bridge Crane



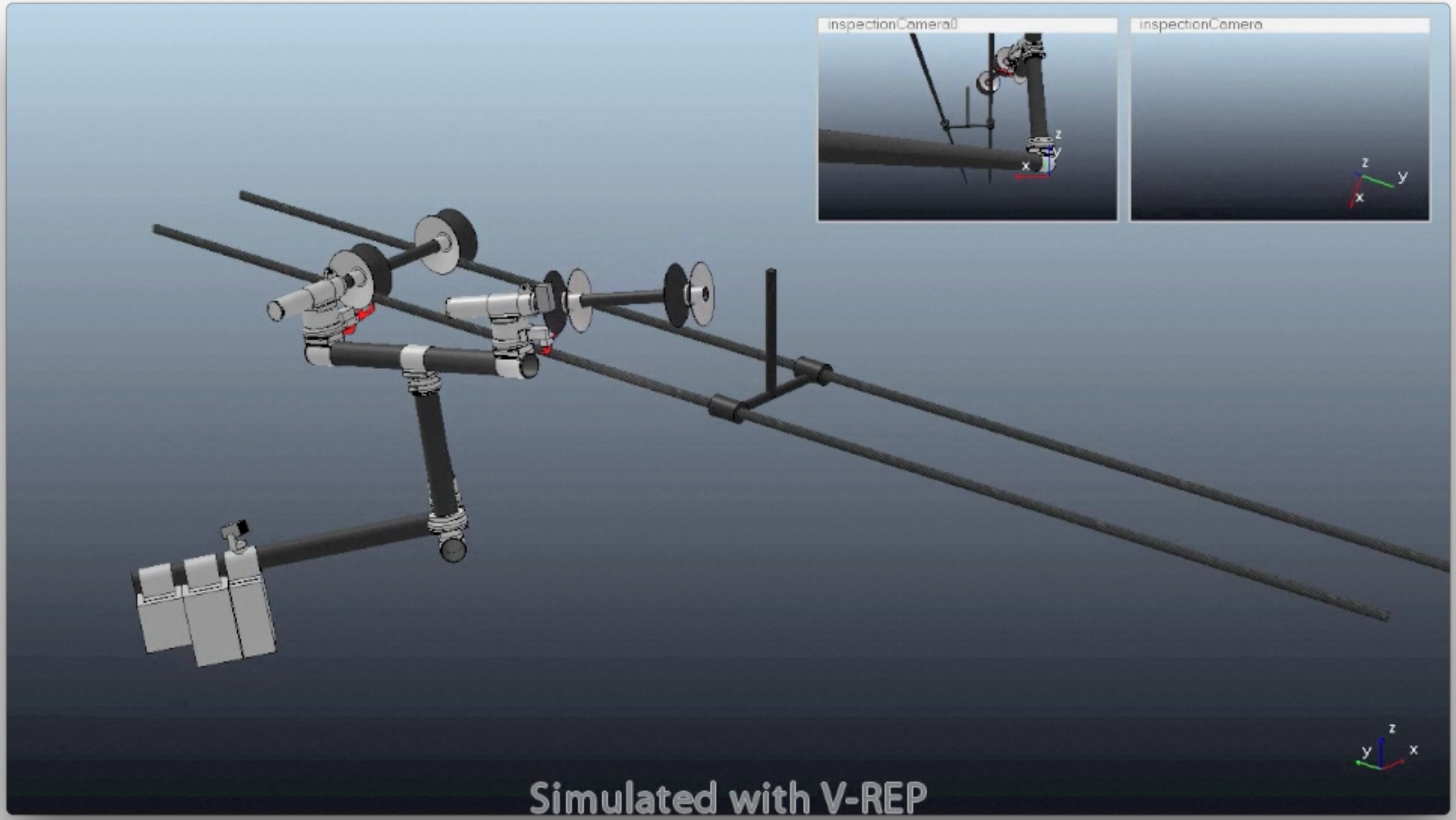
Example Multi-mode Crane Oscillation



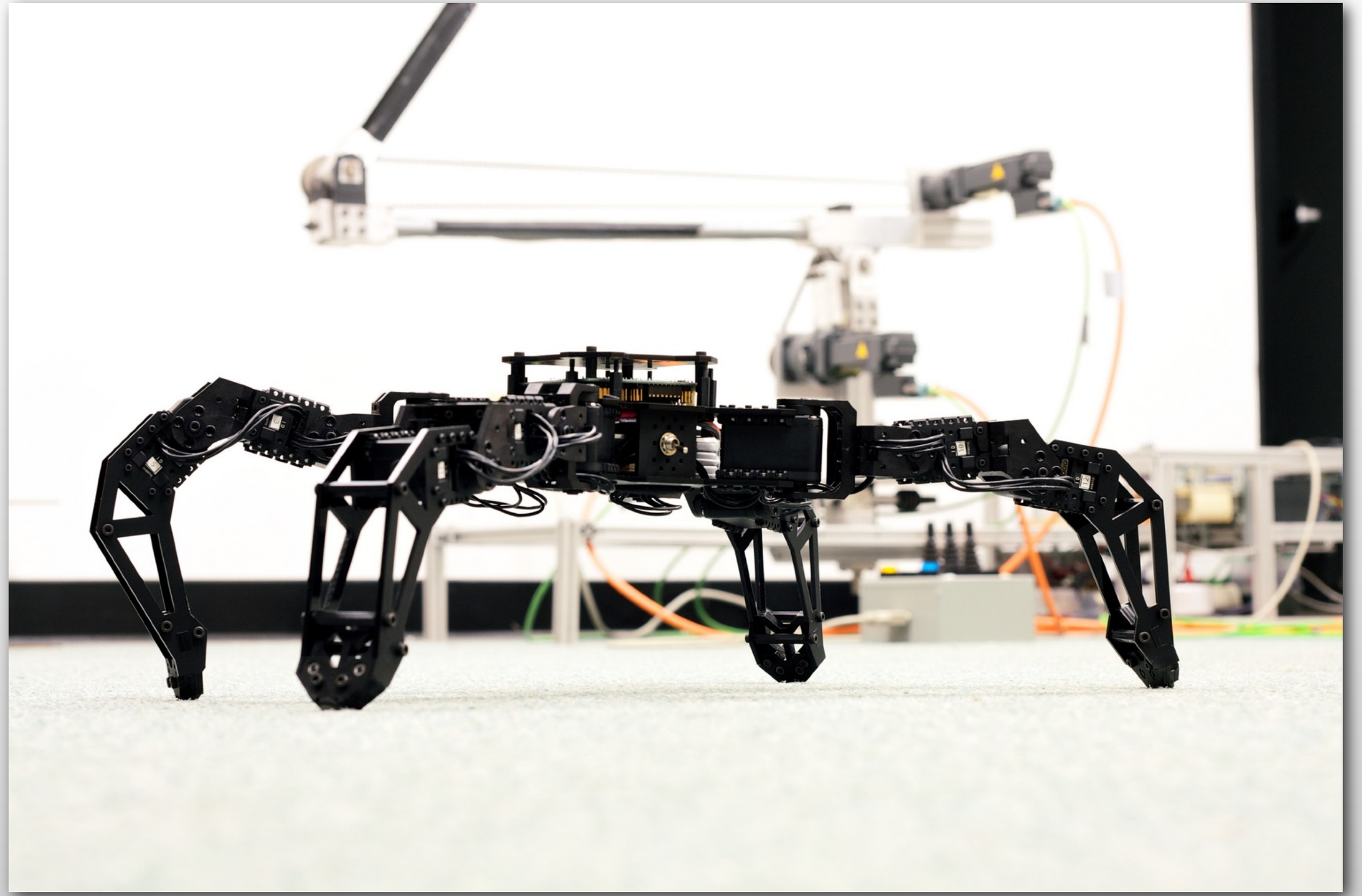
HiBot Expliner Robot



Eliminating Expliner Vibration



Walking Robots



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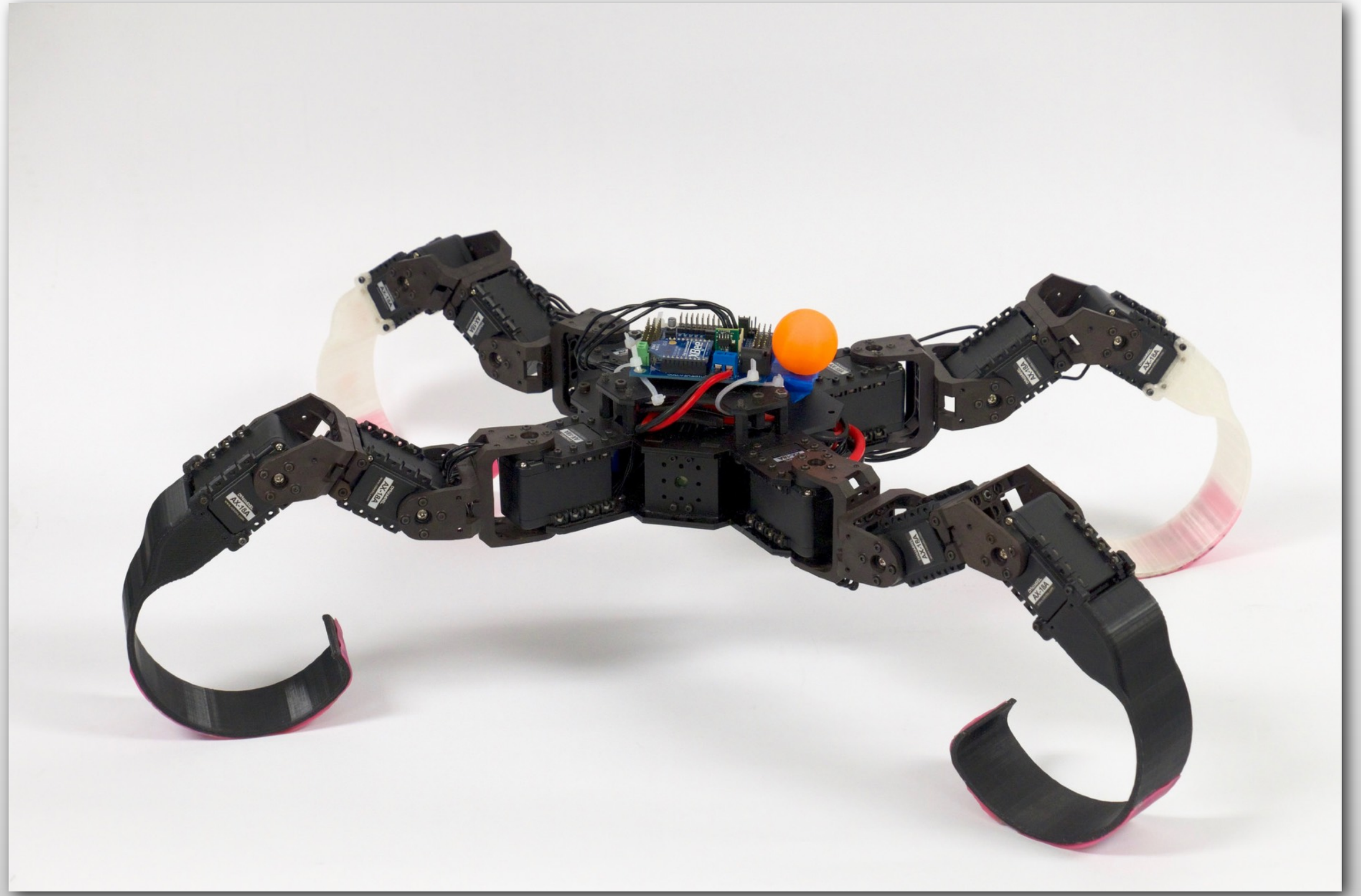

2016 Maritime RobotX Challenge

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Course Info

- Official Description:

  "*Techniques for creating, evaluating, synthesizing, implementing, and documenting solutions to open ended engineering problems, team and project management. Prereq: MCHE 101, ENGR 211.*"

We'll do a series of fun projects, build robots, and hopefully learn something in the process.

Course Info (cont)

- Lecture: TR 3:30 – 4:20pm, CLR 324
- Lab: TR 4:30 – 5:20pm, Mostly in CLR 324
- `http://www.ucs.louisiana.edu/~jev9637/MCHE201.html`
- Office hours: Just stop by or email
- Prereqs: MCHE 101, ENGR 211
- Prerequisite form is due as PDF via email by 5pm on January 25
- Photos: `https://flic.kr/s/aHsmtPMqas`

My Contact Info

- Rougeou 225
- joshua.vaughan@louisiana.edu
- @Doc_Vaughan
- http://www.ucs.louisiana.edu/~jev9637

Your Instructor

- Ms. Hodge – hodge@louisiana.edu

- Rougeou 320-C

The Textbook

- *Introductory Mechanical Design Tools* by William Singhose and Jeff Donnell
  - Print
  - iBooks version

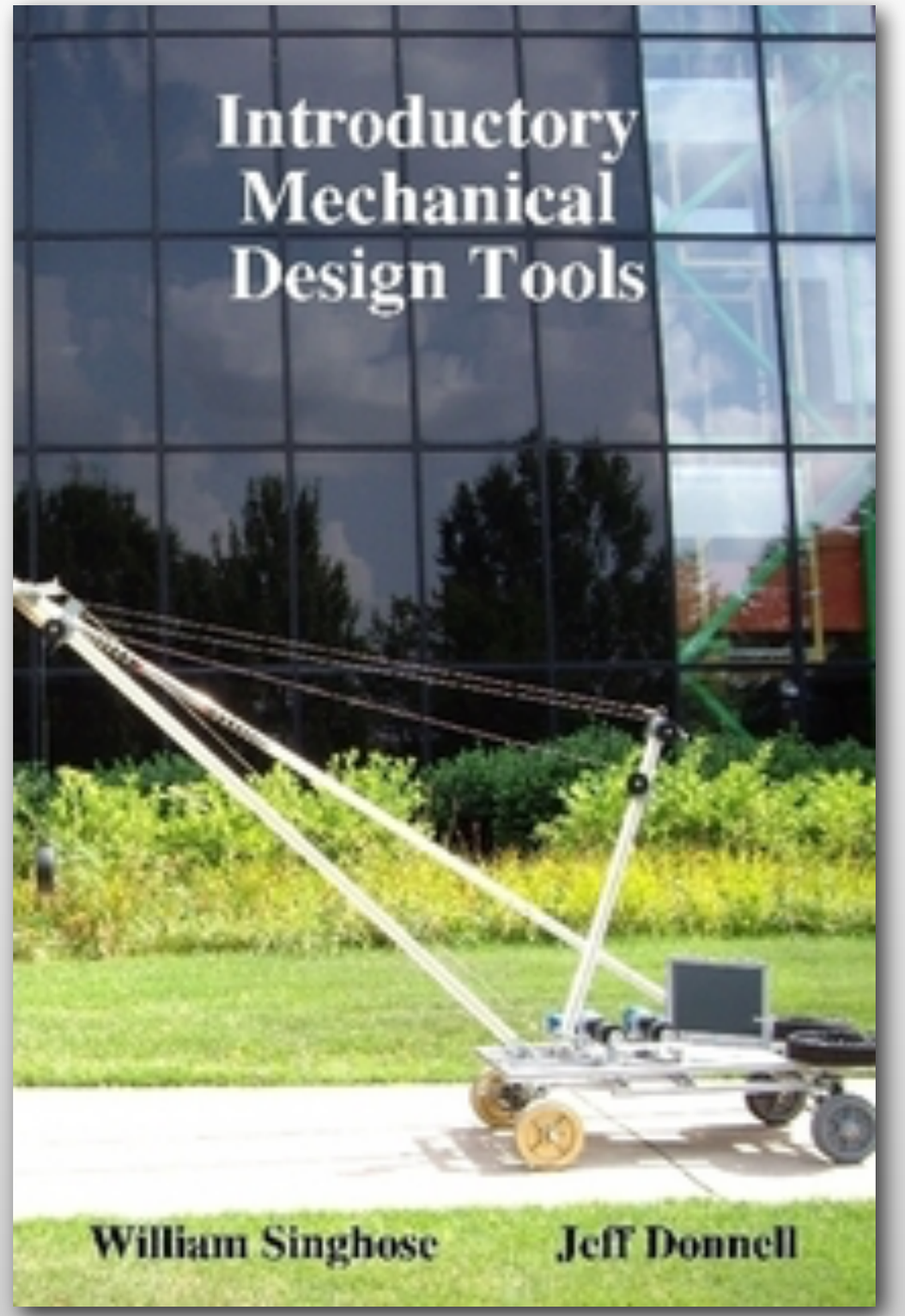


Image from lulu.com

Custom Kit from SparkFun

- Core is pyboard, a ARM-based microcontroller
- Write code in MicroPython
- ~$120
- http://sfe.io/w135021

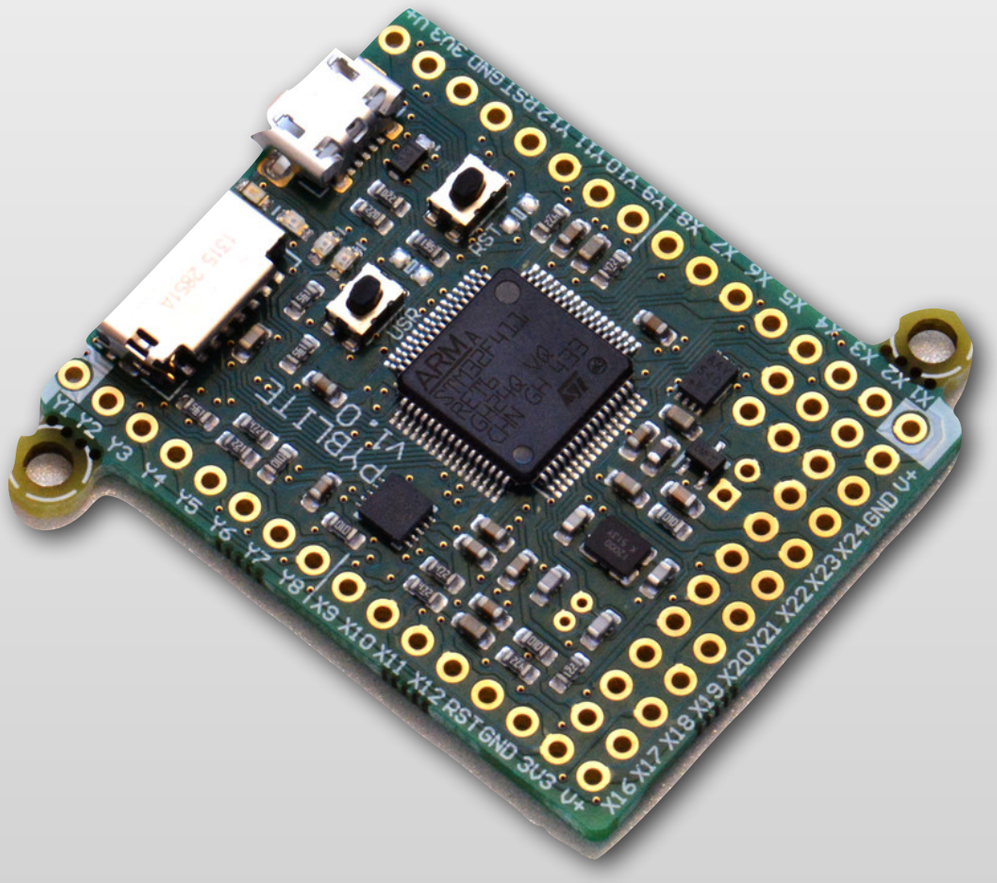


Photo from micropython.org

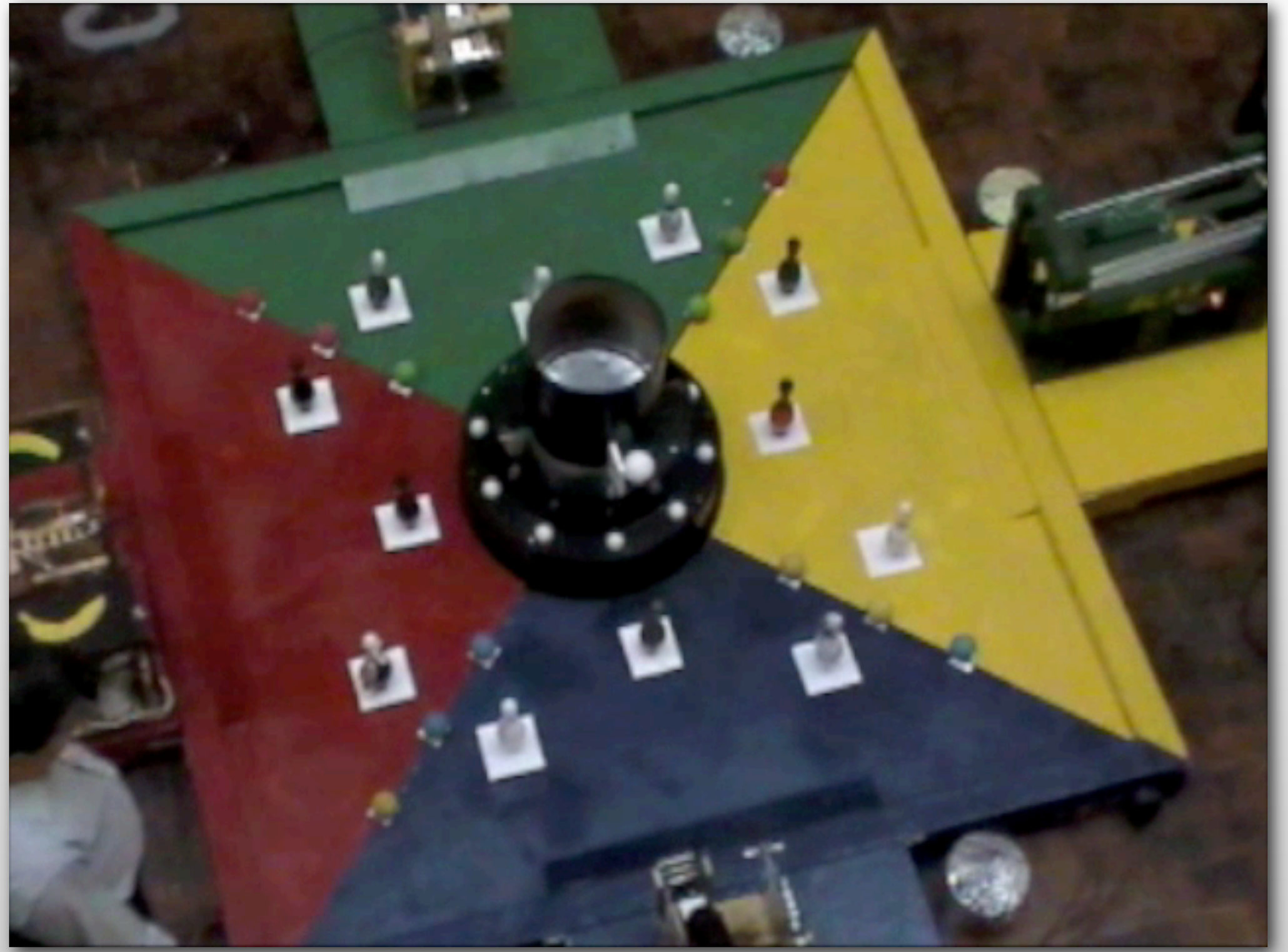
Final Project Kit

- Supported by UL Lafayette Educational Grant and STEP Grants
  - Better motors and driver
  - Solenoid
  - Distance sensor
  - Power Supply
  - Connectors for MCHE201 Track
- *More this term!*

Course Tools/Resources

- GitHub Repository – `https://github.com/DocVaughan/MCHE201---Intro-to-Eng-Design`
  - Example code
  - Report template
- Tons of info on class page – `http://www.ucs.louisiana.edu/~jev9637/MCHE201.html`
  - Links to pictures from past semesters
  - Video lectures on several topics (with more to come!)
  - Example reports
  - Design tool templates and examples
  - Links to external sources of more information

ME2110 at Georgia Tech



MCHE201 – Fall 2018

Tentative Schedule

	Tuesday		Thursday	
January			17	Course Introduction Mini-Proj. 1 Planning
	22	Technical Communication	24	Mini-Proj. 1 Build
	29	Problem Understanding	31	Conceptual Design Mini-Proj. 2 Introduction
February	5	Design Tools Review	7	Tools, Tips, and Tricks Mini-Project 2 Workshop
	12	Management & Planning Mini-Proj. 2 Report Review	14	Mini-Proj. 2 Report Review
	19	Mini-Project 3	21	Design for X Design for Safety
	26	Final Project Introduction	28	Mechatronics Kit Intro. Fabrication Safety Intro.

Note: PDF version on the course site also has tentative assignment due date information.

Tentative Schedule (cont.)

	Tuesday		Thursday	
March	5	Mardi Gras	7	Mechatronics Kit (cont.)
	12	Mechatronics Kit (cont.)	14	Mechatronics Kit (cont.)
	19	Individual Contest	21	Mechatronics Kit (cont.) Final Project Workshop
	26	Mechatronics Kit (cont.)	28	Final Project Workshop
April	2	Preliminary Contest	4	Intellectual Property Mechatronics Kit (cont.)
	9	Final Project Workshop	11	Qualifying Round Contest
	16	Spring Break	18	Spring Break
	23	Final Contest (Tentative)	25	To Be Determined
	30	Design Testing & Evaluation		

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	Tuesday		Thursday	
May			2	Wrap Up
	7	**Final Project Final Reports Due, 5pm**	9	**Final Project Final Presentations Due, 5pm**

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Grading

- Homework – 10%
- Mini-Projects – 30%
  - Mini-Project 1 – 10%
  - Mini-Project 2 – 15%
  - Mini-Project 3 – 5%
- Final Project – 55%
  - Problem Understanding Report – 5%
  - Concept Evaluation Report – 5%
  - Robot Performance – 15%
  - Presentation to Judges – 5%
  - Final Presentation – 10%
  - Final Report – 15%
- Professionalism – 5%

Attendance is Required

- Absences result in letter grade reductions:
  - 3 – 4 absences = 1-letter grade reduction
  - 5 – 6 absences = 2-letter grade reduction
  - 7 – 8 absences = 3-letter grade reduction
  - >9 absences = 4-letter grade reduction
- Late to class?
  - After 3:30, but before 3:35?… Equal to 0.5 absence
  - After 3:35?… Equal to being absent
- Late to lab?
  - After 4:30, but before 4:35?… Equal to 0.5 absence
  - After 4:35?… Equal to being absent
- Rounded to lowest integer for grading
- Excused absence documents must be submitted within 1 week of absence

General Rules/Advice

- Be responsible for your own learning
  - If you have a question, ask
  - Try to understand, not memorize

- Be respectful of yourself and others. We have a class Code of Conduct that we will follow.

Understand, *then* Design & Build

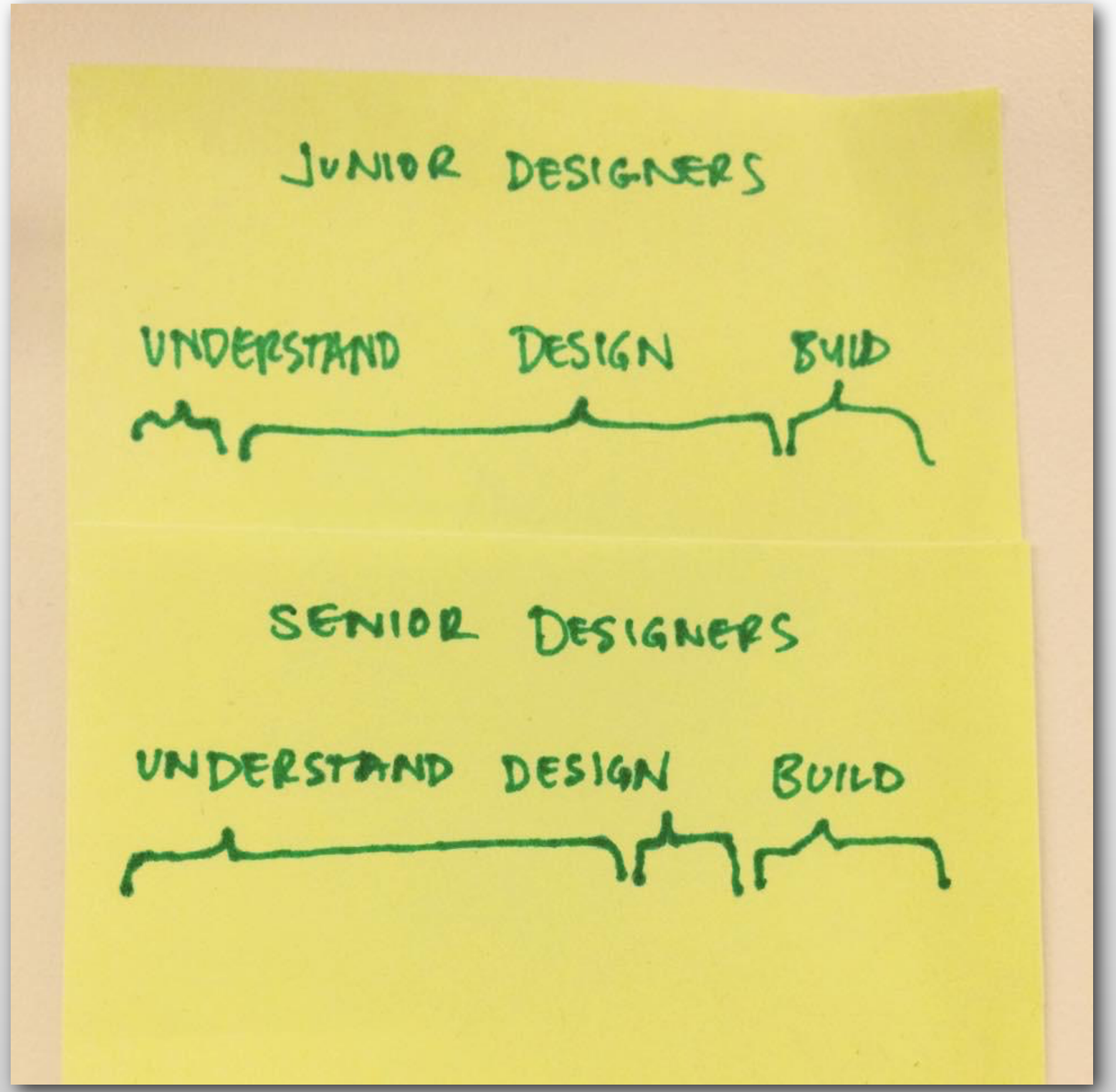

Image from: https://twitter.com/dburka/status/555496843920961536/photo/1

The Creative Process

Kazu Kibuishi
@boltcity

Creative process: 1) This is going to be awesome 2) This is hard 3) This is terrible 4) I'm terrible 5) Hey, not bad 6) That was awesome

8:41 AM - 19 Aug 2013

7,423 RETWEETS **4,629** LIKES

Image from: https://mobile.twitter.com/boltcity/status/369484217349992448

Mini-Project 1

- Design a tower to support a Tennis Ball
  - 4oz. uncooked spaghetti
  - 1 roll “scotch” tape
  - Only contact a piece of 8.5x11" US letter-size paper
  - Paper cannot be secured to the table
  - 45 minutes to build
- Write instructions to build the tower
- Build a tower
- Report on design and results

Mini-Project 1 Timeline

January	17	Mini-Proj. 1 Planning
	24	Instructions for Tower Due
	24	Tower Competition
February	1	Report Due at 5pm

Handout PDF with more information and team assignments both available at the class site